AMENDMENTS TO THE CLAIMS

Previously withdrawn Claims 1-14 and currently pending Claims 15-31 recite as follows:

1. (withdrawn): A method of controlling an optical amplifying device, comprising:

operating the optical amplifying device in a gain threshold mode; and

switching the optical amplifying device to operate in a constant gain mode when an absolute value of a gain error exceeds a gain threshold, wherein the gain error is a difference between a target gain and a gain of the optical amplifying device.

2. (withdrawn): The method of claim 1, wherein at least one of the gain threshold and the target gain are predetermined.

3. (withdrawn): The method of claim 1, wherein in the gain threshold mode, the method further comprises:

measuring input power and output power of the optical amplifying device; and

calculating the gain of the optical amplifying device based on the measured input and output powers.

4. (withdrawn): The method of claim 3, further comprising adjusting the gain of the optical amplifying device to provide an output with a predetermined level of power when the absolute value of the gain error does not exceed the predetermined gain threshold.

5. (withdrawn): The method of claim 1, when operating in the constant gain mode, the method further comprising switching said optical amplifying device to operate in the gain threshold mode after a predetermined period of time has passed.

6. (withdrawn): The method of claim 1, when operating in the constant gain mode, the method further comprising:

detecting whether or not a transient event occurred within a predetermined lock out period;

switching the optical amplifying device to operate in the gain threshold mode if the transient event has not been detected within the lock out period; and

resetting the lock out period and remaining in the constant gain mode if the transient event has been detected within the lock out period.

7. (withdrawn): The method of claim 6, wherein the transient event is one of:

the output power of said optical amplifying device deviating from a reference power level by more than a predetermined difference amount; and

a level of output power of said optical amplifying device fluctuating by more than a predetermined fluctuation amount.

8. (withdrawn): A method of controlling an optical amplifying device, comprising:

operating the optical amplifying device in one of a gain threshold mode and a constant gain mode; and

when in the gain threshold mode, switching the optical amplifying device to operate in a constant gain mode when an absolute value of a gain error exceeds a gain threshold, wherein the gain error is a difference between a target gain and a gain of the optical amplifying device.

9. (withdrawn): The method of claim 8, wherein at least one of the gain threshold and the target gain are predetermined.

10. (withdrawn): The method of claim 8, wherein in the gain threshold mode, the method further comprising:

measuring input power and output power of the optical amplifying device; and

calculating the gain of the optical amplifying device based on the measured input and output powers.

11. (withdrawn): The method of claim 10, further comprising adjusting the gain of the optical amplifying device to provide an output with a predetermined level of power when the absolute value of the gain error does not exceed the predetermined gain threshold.

12. (withdrawn): The method of claim 8, when operating in the constant gain mode, the method further comprising switching said optical amplifying device to operate in the gain threshold mode after a predetermined period of time has passed.

13. (withdrawn): The method of claim 8, when operating in the constant gain mode, the method further comprising:

detecting whether or not a transient event occurred within a predetermined lock out period;

switching the optical amplifying device to operate in the gain threshold mode if the transient event has not been detected within the lock out period; and

resetting the lock out period and remaining in the constant gain mode if the transient event has been detected within the lock out period.

14. (withdrawn): The method of claim 13, wherein the transient event is one of:

the output power of said optical amplifying device deviating from a reference power level by more than a predetermined difference amount; and

a level of output power of said optical amplifying device fluctuating by more than a predetermined fluctuation amount.

15. (original): An optical amplifying apparatus, comprising:

an optical amplifying device;

a controlling device configured for operating said optical amplifying device in one of a gain threshold mode and a constant gain mode, said controlling device further configured for switching the optical amplifying device from operating in the gain threshold mode to operating in the constant gain mode when an absolute value of a gain

error exceeds a gain threshold, wherein the gain error is a difference between a target gain and a gain of the optical amplifying device; and

a measuring device configured to measure power levels on a plurality of points within said optical amplifying device including at least an input power (P_{IN}) and an output power (P_{OUT}) of the optical amplifying device, said measuring device also configured to communicate with said controlling device.

16. (original): The apparatus of claim 15, wherein at least one of the gain threshold and the target gain are predetermined.

17. (original): The apparatus of claim 15, wherein said optical amplifying device comprises:

a plurality of optical amplifier stages connected in series, wherein an input of a first optical amplifier stage is an input of said amplifying device; and

one or more variable optical attenuators (VOA) connected in series with said optical amplifier stages such that each VOA receives an output of one optical amplifier stage and outputs to a next optical amplifier stage, wherein at least one VOA is controlled by said controlling device,

wherein said measuring device is further configured to measure power levels on a plurality of points along a connected chain of said plurality of optical amplifier stages and VOAs.

18. (original): The apparatus of claim 17, wherein said optical amplifying device further comprises one or more dispersion compensation fibers (DCF) connected in series with said optical amplifier stages and said VOAs such that each DCF receives an output of the optical amplifier stage and outputs to the next optical amplifier stage.

19. (original): The apparatus of claim 17, wherein in the gain threshold mode, said controlling device is configured for:

calculating the gain of the optical amplifying device based on P_{IN} and P_{OUT};

adjusting the gain such that P_{OUT} is substantially equal to a predetermined level of power when the absolute value of the gain error does not exceed the predetermined gain threshold.

20. (original): The apparatus of claim 15, when operating in the constant gain mode, wherein said controlling device is further configured for switching said optical amplifying device to operate in the gain threshold mode after a predetermined period of time has passed.

21. (original): The apparatus of claim 17, wherein in the constant gain mode, said controlling device is configured for:

detecting whether or not a transient event occurred within a predetermined lock out period;

switching the optical amplifying device to operate in the gain threshold mode if the transient event has not been detected within the lock out period; and

resetting the lock out period and leaving optical amplifying device to operate in the constant gain mode if the transient event has been detected within the lock out period.

22. (original): The apparatus of claim 21, wherein the transient event is one of:

the output power of said optical amplifying device deviating from a reference power level by more than a predetermined difference amount; and

a level of output power of said optical amplifying device fluctuating by more than a predetermined fluctuation amount.

23. (original): The apparatus of claim 15, wherein said optical amplifying device comprises:

first, second, and third optical amplifier stages connected in series, wherein an input of the first optical amplifier stage is an input of said optical amplifying device; and

a variable optical attenuator connected between said first and second optical second amplifier stages, said variable optical attenuator configured to be controlled by said controlling device for controlling gain of said optical amplifying device,

wherein said measuring device is configured to measure power levels at input to said first optical amplifier stage (P_{IN}) output of said third optical amplifier stage (P_{OUT}).

24. (original): The apparatus of claim 23, wherein in the gain threshold mode, said controlling device is configured for:

calculating the gain of the optical amplifying device based on P_{IN} and P_{OUT};

adjusting the gain such that P_{OUT} is substantially equal to a predetermined level of power when the absolute value of the gain error does not exceed the predetermined gain threshold.

25. (original): The apparatus of claim 24, wherein in the constant gain mode, said controlling device is further configured for resetting a lock out period and leaving optical amplifying device to operate in the constant gain mode if the transient event has been detected within the lock out period.

26. (original): The apparatus of claim 25, wherein the transient event is one of:

the output power of said optical amplifying device deviating from a reference power level by more than a predetermined difference amount; and

a level of output power of said optical amplifying device fluctuating by more than a predetermined fluctuation amount.

27. (original): The apparatus of claim 25, wherein the calculated gain is the ratio of P_{OUT} to P_{IN} and the gain of the optical amplifying device is adjusted by adjusting a gain of said VOA in response to the calculated gain.

28. (original): The apparatus of claim 23:

wherein said optical amplifying device further comprises a dispersion compensation fiber (DCF) connected in series in between said first and second optical amplifier stages,

wherein said measuring device is further configured to measure power levels at output of said first optical amplifier stage (P_{PRE_OUT}), input to said DCF (P_{DCF_IN}), and output of said DCF (P_{POST_IN}).

29. (original): The apparatus of claim 23, when operating in the constant gain mode, wherein said controlling device is further configured for switching said optical amplifying device to operate in the gain threshold mode after a predetermined period of time has passed.

30. (original): The apparatus of claim 23, wherein in the constant gain mode, said controlling device is configured for:

detecting whether or not a transient event occurred within a predetermined lock out period;

switching the optical amplifying device to operate in the gain threshold mode if the transient event has not been detected within the lock out period; and

resetting the lock out period and leaving optical amplifying device to operate in the constant gain mode if the transient event has been detected within the lock out period.

31. (original): The apparatus of claim 30, wherein the transient event is one of:

the output power of said optical amplifying device deviating from a reference power level by more than a predetermined difference amount; and

a level of output power of said optical amplifying device fluctuating by more than a predetermined fluctuation amount.